

Large-scale Transaction Processing

Recent Mainframe Trends & Their Implications for the TPF Environment

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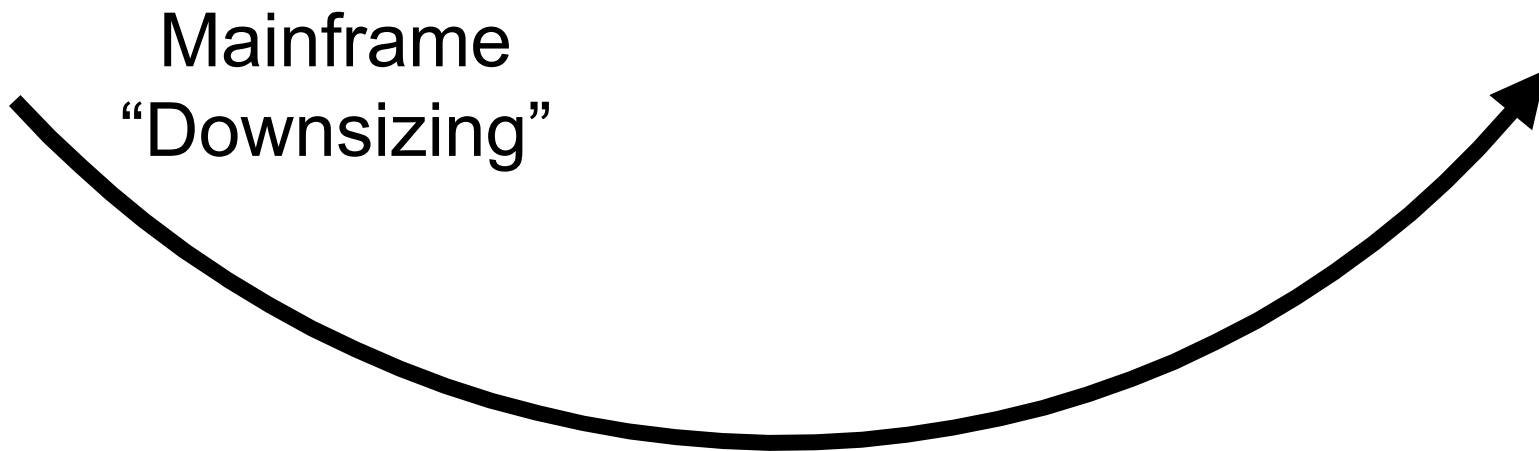


Agenda



- **Return of the mainframe**
- Mainframe trends
- TPF implications

The U-Curve Effect



Factors in Mainframe Revival (1)

General Experiences

- “Downsizing”
- Client/server realism
- End of Y2K rush

Alternative Approaches

- ISV applications
- Legacy upgrades
- New custom

Pricing

- CMOS hardware
- IBM software

Factors in Mainframe Revival (2)



Focus on Service Quality

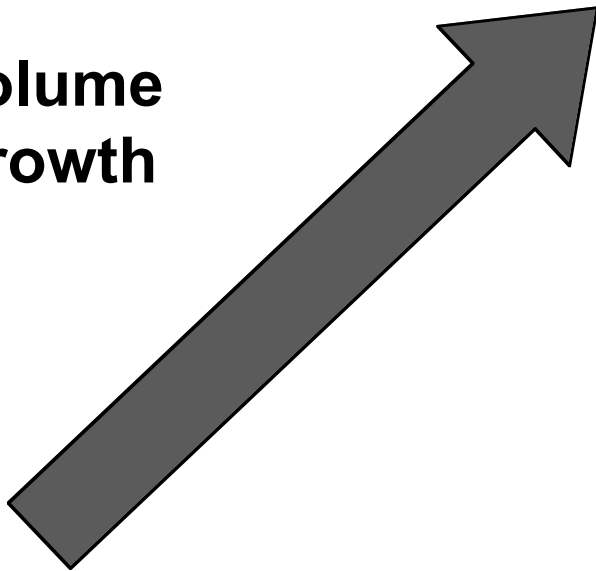
- 24x7 availability
- Response time
- Service time
- Transaction integrity
- Security
- Backup/recovery

Recognition of bottom-line business impact – for new Web as well as conventional applications

Factors in Mainframe Revival (3)

Volume Impacts

**Volume
Growth**



Recognition that volume & service quality are closely related

. . . . it is a great deal more difficult to maintain service quality for high-volume, business-critical systems than in less demanding environments

Factors in Mainframe Revival (4)



Growing sensitivity to:

- Manageability

- Complexity

- Cost

Agenda



- Return of the mainframe
- **Mainframe trends**
- TPF implications

Core Mainframe Role: ITG Study



General focus

- Large U.S.-based organizations
- High-volume business transactions

Core transaction systems

- Brokerage (>\$5 billion assets)
- Retail banking (>\$5 billion assets)
- Insurance (>\$5 billion assets)
- Retail (>\$1 billion sales)
- Utilities (>1 million customers)

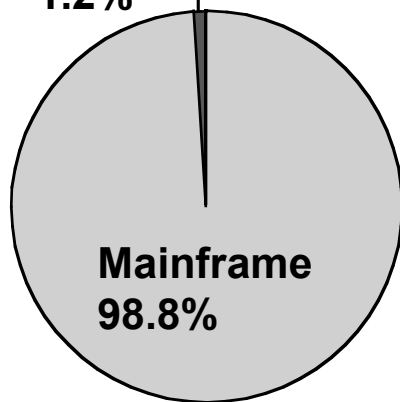
Mainframes: Still There

Business transaction volumes by platform

RETAIL BANKS
Over \$5 billion in assets

Other Platforms

1.2%



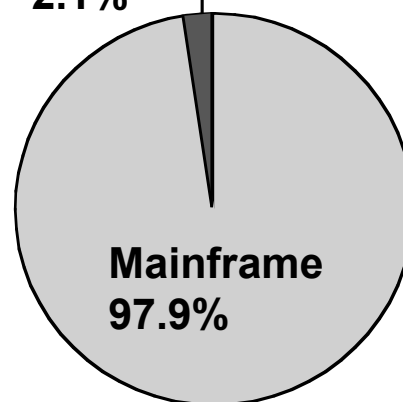
Mainframe
98.8%

Total transactions: 93.8 billion
Base: 67 companies

INSURANCE COMPANIES
Over \$5 billion in assets

Other Platforms

2.1%



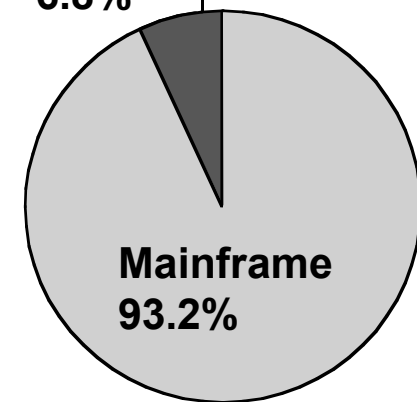
Mainframe
97.9%

Total transactions: 15.6 billion
Base: 61 companies

BROKERAGE FIRMS
Over \$5 billion in assets

Other Platforms

6.8%



Mainframe
93.2%

Total transactions: 10.2 billion
Base: 7 Companies

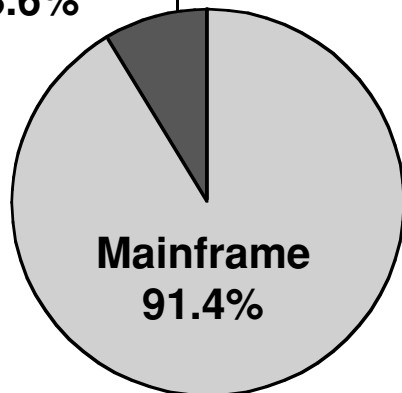
Source: *e-Transactions in Financial Services* Management Brief, International Technology Group

Mainframes: Still There (Continued)

Business transaction volumes by platform

RETAILERS
Sales Over \$1 Billion

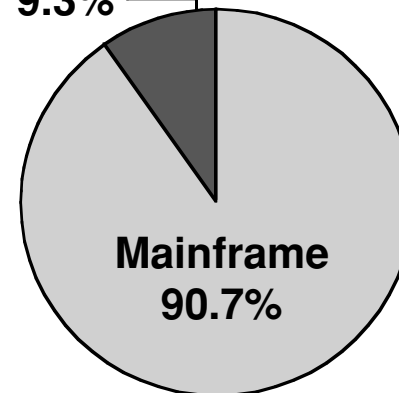
Other Platforms
8.6%



Total transactions: 33.4 billion
Base: 93 companies

UTILITIES
Over One Million Customers

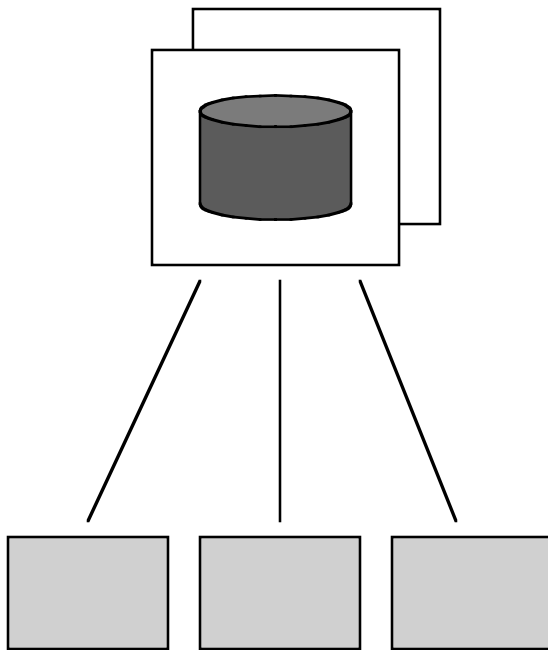
Other Platforms
9.3%



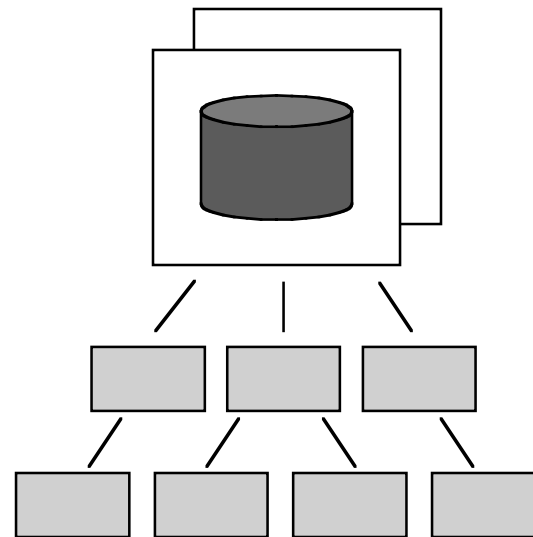
Total transactions: 2.65 billion
Base: 61 companies

Source: *Strategies for e-Volume* Management Brief, International Technology Group

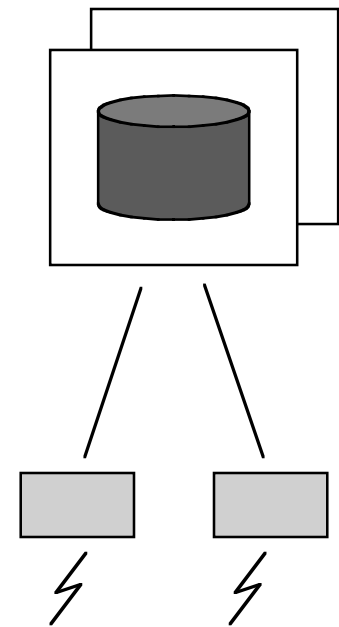
Multi-tier Architectures: Some Examples



Physically distributed
e.g. branch automation
point of sale
remote office



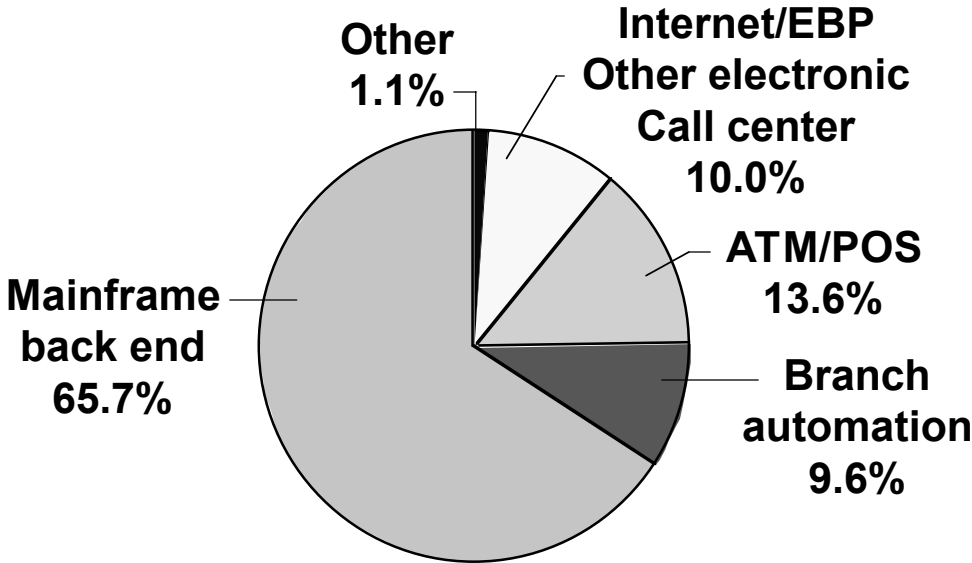
Web transactions
e.g. financial services



FT switching
e.g. securities
ATM/POS

Transaction Volume Impact: Retail Banking Example

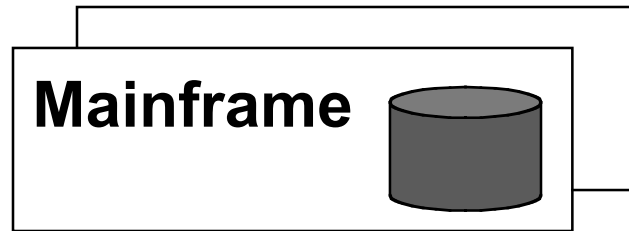
Overall Volume: U.S. Retail Banks (2001)



Total transactions: 142.7 billion

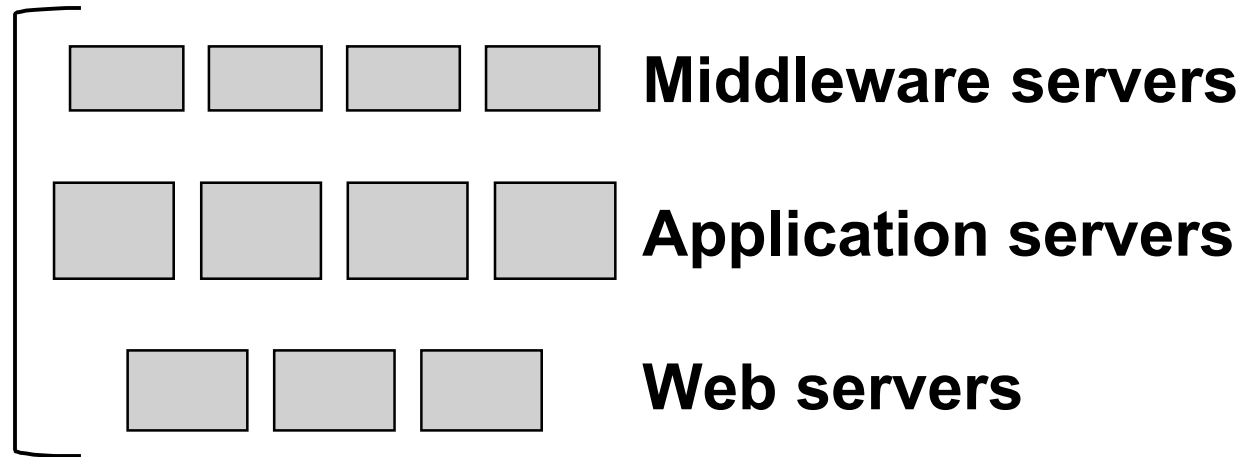
Transaction Volume Impact: Online Brokerage Example

**225% (CPU)
& 200% (Disk)
Capacity
Increase**

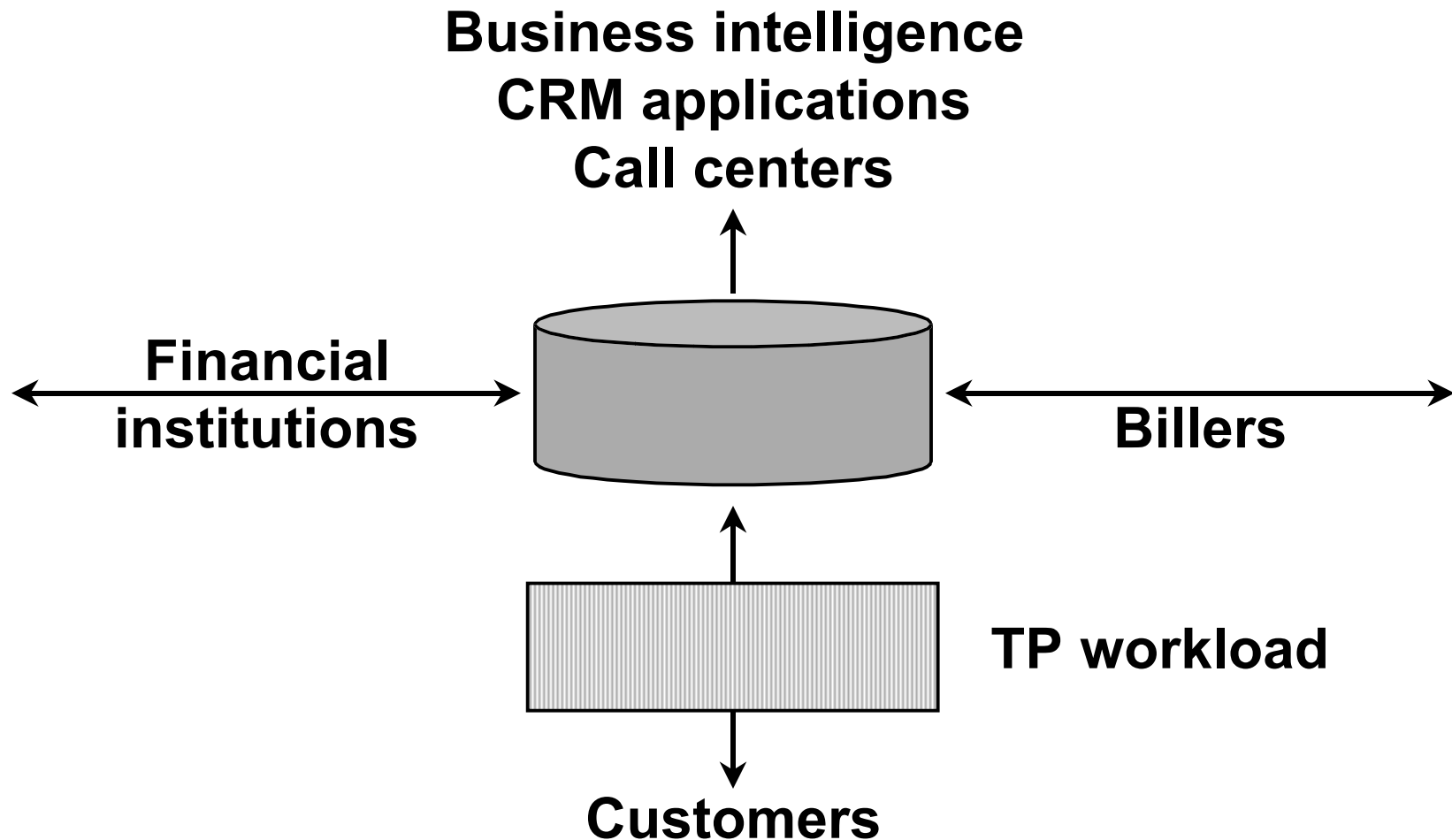


→ **GDPS**

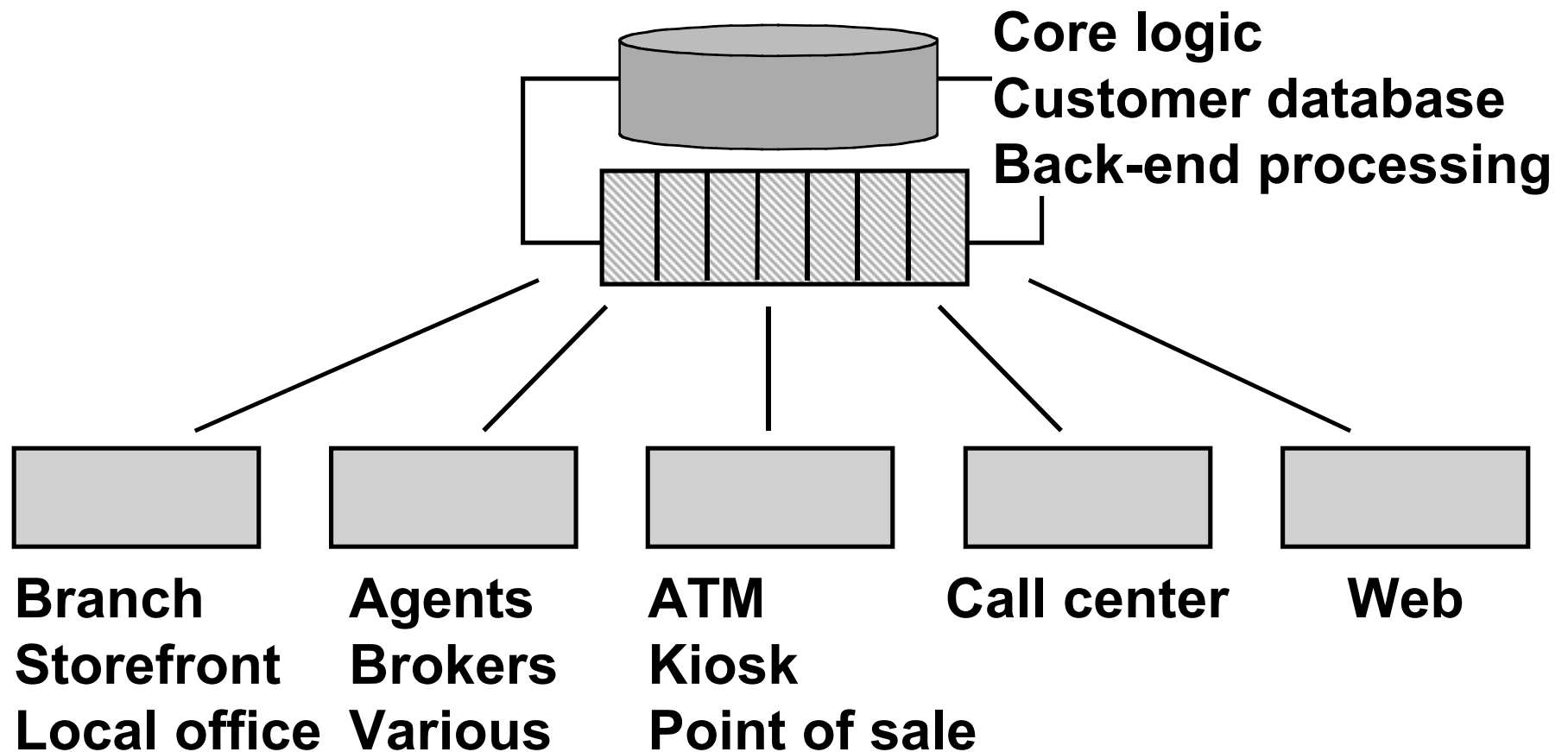
**765%
Capacity
Increase**



Transaction Volume Impact: Financial Services Example



Mainframe Back-End Role: Implications



Source: *Strategies for e-Volume* Management Brief, International Technology Group

Application Trends



ISV Software

- Examples
 - SAP
 - PeopleSoft
 - Siebel
 - Various

Maintain/Enhance

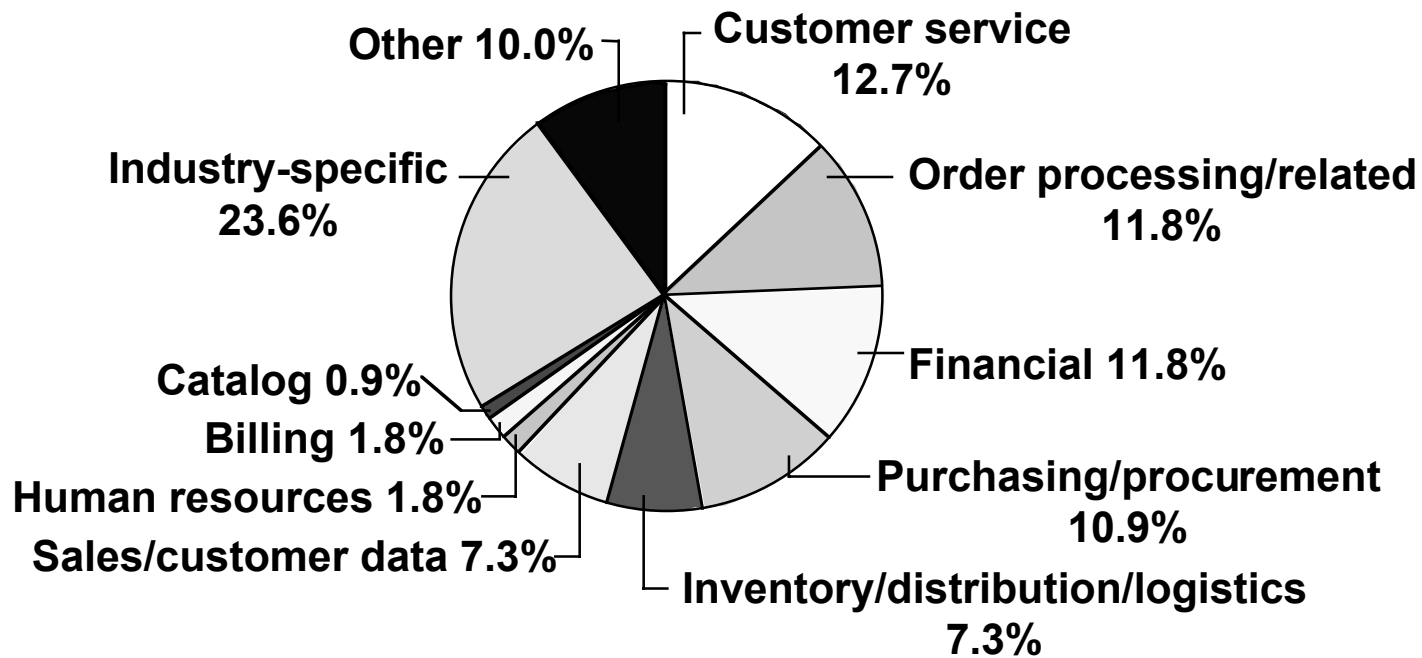
- New tools/
techniques
- Outsourcing
- Offshore

Legacy Renovation

- Major projects
- C/C++ migration
- Reengineering
- Web enablement

Legacy Renovation Picture

Types of Reengineered Legacy Applications

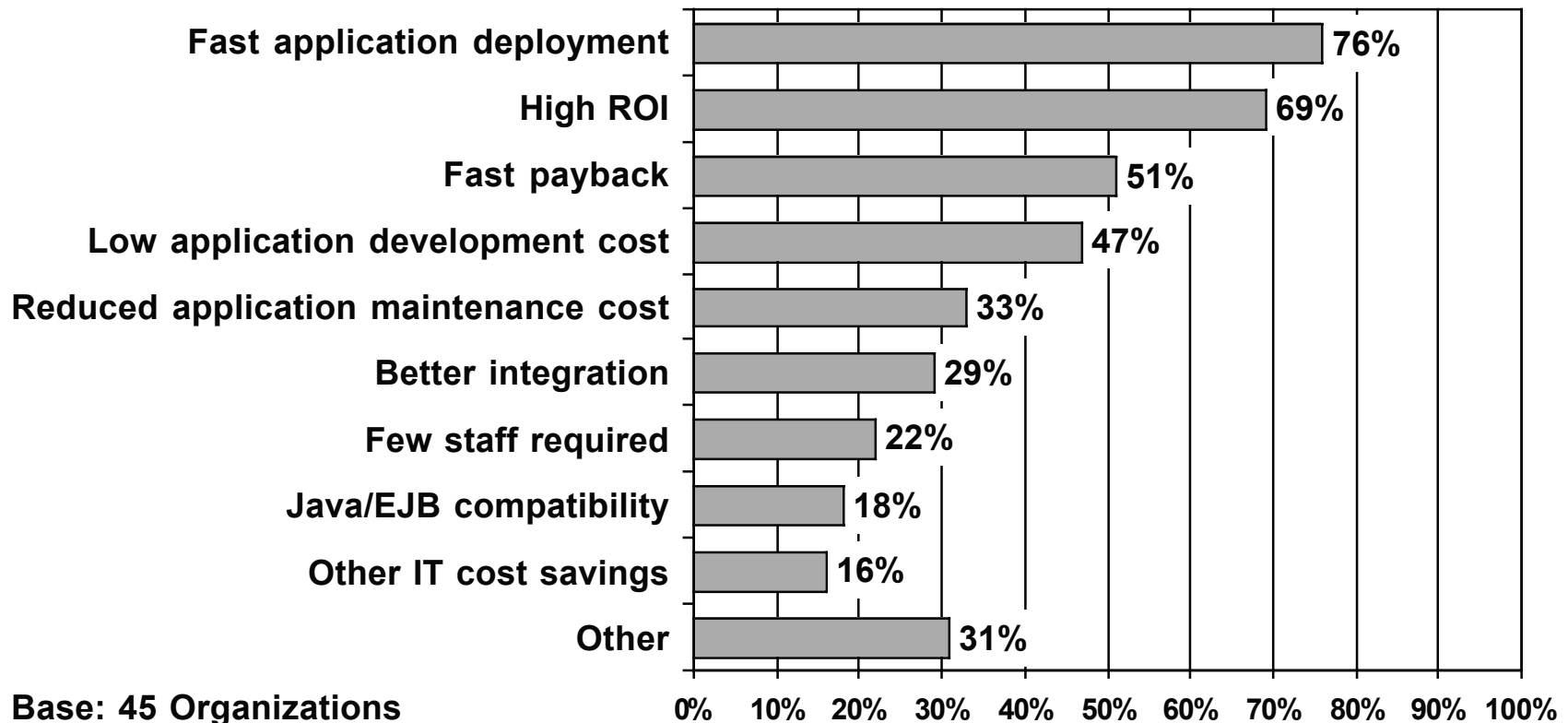


Base: 110 Responses from 45 Organizations
(COBOL applications)

Source: *Value Proposition for Legacy COBOL* Management Brief, International Technology Group

Legacy Renovation Picture (Continued)

Benefits of Reengineered Legacy Applications



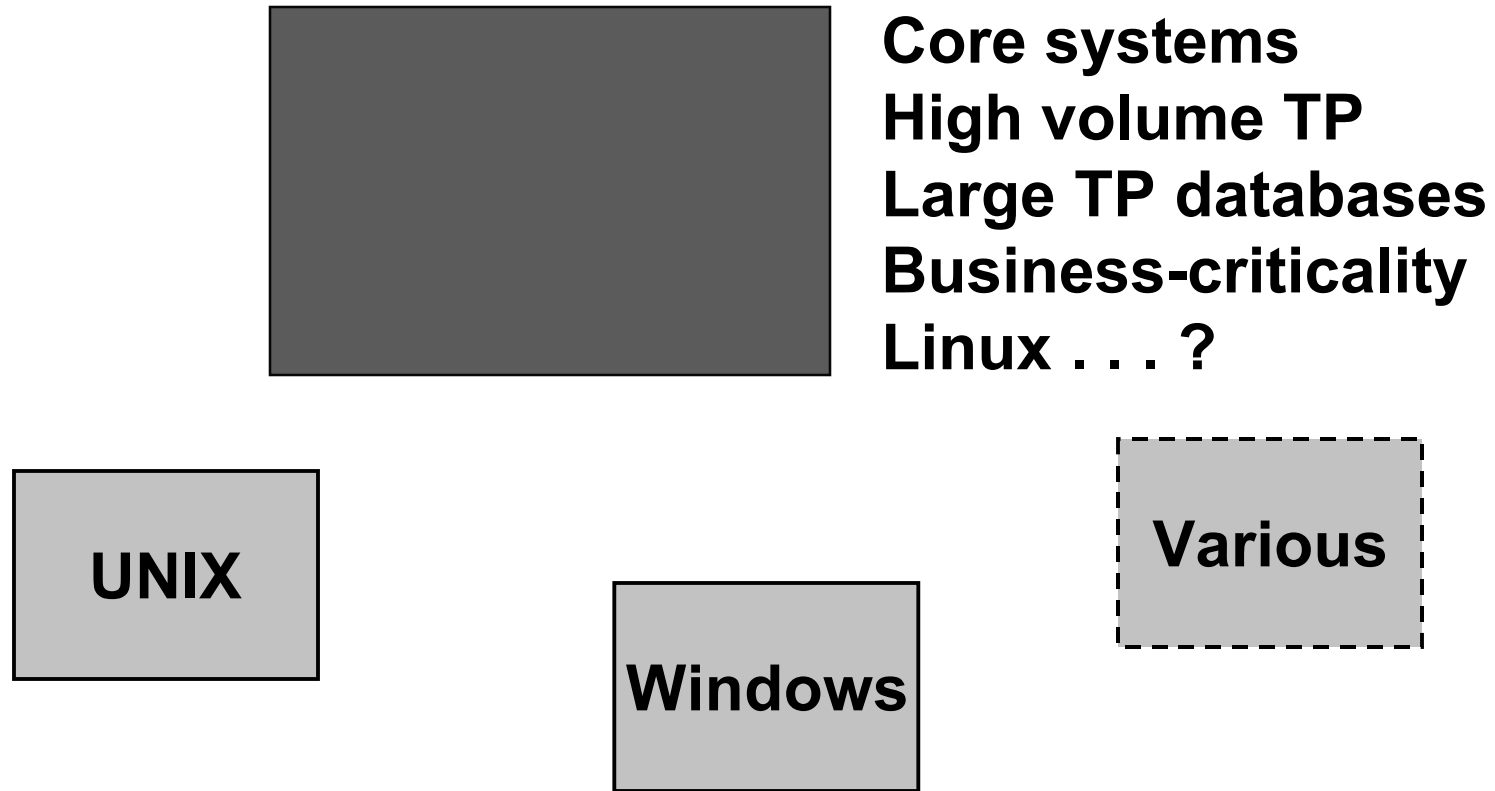
Source: *Value Proposition for Legacy COBOL* Management Brief, International Technology Group

Lessons Learned . . . & Relearned



- Core business logic & data may remain valid & useable
- Key user interface, data access & interoperability requirements may be met without rehosting
- Code optimization/tuning can have a major impact on performance
- Application development/maintenance productivity may be improved by changing tools & practices

Repositioning Mainframes



Scalability Issue

System sizes

Industry	Mainframe-based (Transactions per Year)	Other Platforms (Transactions per Year)
Retail	23 million to 5.22 billion	36 million to 355 million
Banking	62 million to 10.83 billion	7 million to 138 million
Insurance	8 million to 806 million	3 million to 28 million
Utilities	15 million to 338 million	0.4 million to 33 million

Source: *Strategies for e-Volume* Management Brief, International Technology Group

Scalability:

Any Questions?

Z900 Model	Online Purchasing (Concurrent users)	Online Self Service (Concurrent users)	Online Billing & A/R (000 lines/hour)	GL Posting (000 items/hour)
116	35,634	41,147	3,816	4,517
3 x 116	92,149	106,406	9,869	11,680
6 x 116	180,028	207,882	19,280	22,820
12 x 116	347,220	400,942	37,186	44,012
18 x 116	501,576	579,179	53,717	63,578
32 x 116	811,880	937,494	86,950	102,911

Model	Online Purchasing (Concurrent users)	Online Self Service (Concurrent users)	Online Billing & A/R (000 lines/hour)	GL Posting (000 items/hour)
S/390 G6	518,132	598,297	55,490	65,677
z900	811,880	937,494	86,950	102,911
Sun E10000	6,919	7,245	542	738

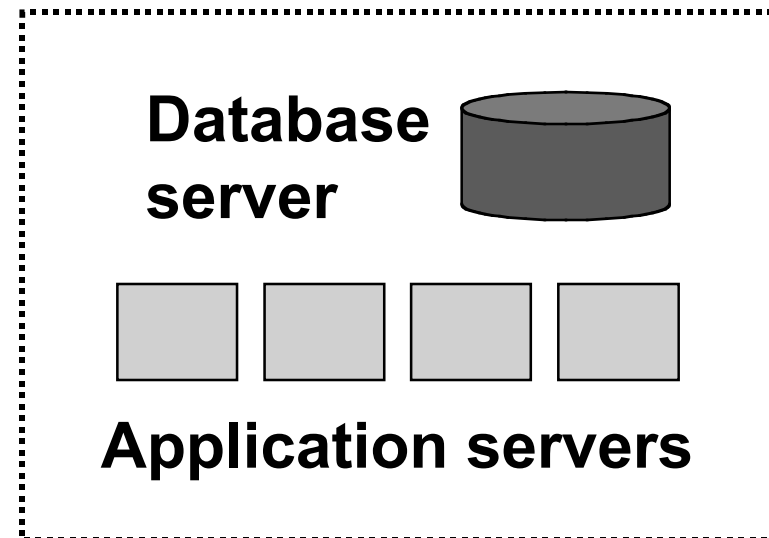
Source: *Metrics for e-Growth* Management Brief, International Technology Group

Mainframe Linux Appeal

General Drivers

- Server consolidation
- Service quality
- Manageability/reduced complexity
- Cost savings

System Integration



**N-tier architecture on
single physical server**

Agenda



- Return of the mainframe
- Mainframe trends
- **TPF implications**

TPF Environment



General Observations

- Extremely large TP systems with extremely high levels of service quality
- Extremely efficient process/switching model
- Extremely efficient management/throughput of volatile data (inc. logging)
- Back-end databases
- New technology support
 - IP, mail, Web
 - C++, SQL/CORBA/various

New Applications Potential (1)

High-volume email

**High-volume Web serving
(eBusiness)**

ITG study based on:

- Actual user profiles
- Real-life Sun configurations
- TPF user experiences

Messaging Comparisons (1)

Type of Network	A Corporate	B Corporate	C ISP	D Telco	E ISP	F ISP
Number users	100,000	245,000	5 million	12 million	25 million	100 million
Messages per day	2.3 million	3.8 million	65 million	80 million	220 million	180 million
Average message size	25 KB	18 KB	12 KB	7 KB	10 KB	5 KB
Average mailbox (used)	6 MB	4 MB	3 MB	1.5 MB	2 MB	0.5 MB
Peak active users	33%	20%	15%	10%	10%	5%
TPF SCENARIO (with mirrored storage)						
E-mail system	TPF Mail	TPF Mail	TPF Mail	TPF Mail	TPF Mail	TPF Mail
Configuration	H70 1 GB RAM 1.6 TB ESS	z1C1 1 GB RAM 2.4 TB ESS	2 x z1C8 2 GB RAM each 24 TB ESS	2 x z111 2 GB RAM each 28.8 TB ESS	4 x z114 2 GB RAM each 120 TB ESS	5 x z115 2 GB RAM each 240 TB ESS
Number personnel	3	3	5	5	8	10
SUN SCENARIO (with mirrored storage)						
E-mail system	Sendmail	Sendmail	Sendmail	OpenWave	Sendmail	qmail
Configuration	E6800 16 CPUs 16 GB RAM 2 TB SSA	E6800 24 CPUs 24 GB RAM 2.8 TB SSA	14 x E6800 24 CPUs each 24 GB RAM each 28 TB SSA	20 x E6800 24 CPUs each 24 GB RAM each 33.6 TB SSA	45 x E6800 24 CPUs each 24 GB RAM each 140 TB SSA	83 x E6800 24 CPUs each 24 GB RAM each 280 TB SSA
Number personnel	4	5	20	25	50	80

Source: *Value Proposition for TPF Mail & Web Serving* Management Brief, International Technology Group

Messaging Comparisons (2)

Type of Network	A Corporate	B Corporate	C ISP	D Telco	E ISP	F ISP
Number users	100,000	245,000	5 million	12 million	25 million	100 million
Messages per day	2.3 million	3.8 million	65 million	80 million	220 million	180 million
Average message size	25 KB	18 KB	12 KB	7 KB	10 KB	5 KB
Average mailbox (used)	6 MB	4 MB	3 MB	1.5 MB	2 MB	0.5 MB
Peak active users	33%	20%	15%	10%	10%	5%
TPF SCENARIO (with mirrored storage)						
5-Year Cost (\$000)						
Hardware	\$558	\$737	\$8,653	\$10,885	\$29,462	\$43,637
Maintenance	100	132	1,549	1,948	5,274	7,811
Software	300	384	4,686	5,952	14,298	18,495
Personnel	1,448	1,448	2,413	2,413	3,861	4,826
TOTAL	\$2,406	\$2,701	\$17,301	\$21,198	\$52,895	\$74,769
SUN SCENARIO (with mirrored storage)						
5-Year Cost (\$000)						
Hardware	\$818	\$973	\$12,768	\$17,750	\$44,865	\$84,417
Maintenance	218	259	3,396	4,722	11,934	22,455
Software	5	5	70	100	225	415
Personnel	1,831	2,289	9,156	11,444	22,889	36,622
TOTAL	\$2,872	\$3,526	\$25,390	\$34,016	\$79,913	\$143,909

Source: *Value Proposition for TPF Mail & Web Serving* Management Brief, International Technology Group

Messaging Comparisons (3)

Type of Network	A Corporate	B Corporate	C ISP	D Telco	E ISP	F ISP
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Average mailbox (used)	6 MB	4 MB	3 MB	1.5 MB	2 MB	0.5 MB
Peak active users	33%	20%	15%	10%	10%	5%
TPF SCENARIO (with mirrored storage)						
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Hardware	\$558	\$737	\$8,653	\$10,885	\$29,462	\$43,637
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TOTAL	\$2,406	\$2,701	\$17,301	\$21,198	\$52,895	\$74,769
SUN SCENARIO (with mirrored storage & clustering)						
5-Year Cost (\$000)						
Hardware	\$1,636	\$1,946	\$15,082	\$29,697	\$51,708	\$96,356
Maintenance	435	518	4,012	7,899	13,754	25,630
Software	39	39	310	446	1,003	1,838
Personnel	1,831	2,289	9,156	11,444	22,889	36,622
TOTAL	\$3,941	\$4,792	\$28,560	\$49,486	\$89,354	\$160,446

Source: *Value Proposition for TPF Mail & Web Serving* Management Brief, International Technology Group

E-business Comparisons (1)

Company Type of Business	G B2B Exchange	H Online Travel	I Online Auctions
Key metrics	500K regular users 200K supplier listings 4M catalog items 30K orders/day 250M queries/searches/day	25M regular users 45M fares 25K bookings/day 35K transactions/day 330K queries/searches/day	30M regular users 5M active auctions/day 22M active items/day 1.8M bids/day 13M queries/searches/day
TPF SCENARIO			
Configuration	2 x z101 1 GB RAM each 600 GB ESS each TPF cluster	z102 1 GB RAM 60 GB ESS TPF	2 x z1C2 1 GB RAM each 2.4 TB DASD each OS/390-DB2-CICS 2 x z102 1 GB RAM each 2.4 TB DASD each TPF cluster
Number personnel	3	1	7
SUN SCENARIO			
Configuration	20 x E6800 24 CPUs each 24 GB RAM each 800 GB SSA each Oracle Sun Cluster	2 x E6800 24 CPUs each 24 GB RAM each 80 GB SSA	8 x E6800 24 CPUs each 24 GB RAM each 11.2 TB SSA Oracle
Number personnel	5	2	12

Source: *Value Proposition for TPF Mail & Web Serving* Management Brief, International Technology Group

E-business Comparisons (2)

Company Type of Business	G B2B Exchange	H Online Travel	I Online Auctions
Key metrics	500K regular users 200K supplier listings 4M catalog items 30K orders/day 250M queries/searches/day	25M regular users 45M fares 25K bookings/day 35K transactions/day 330K queries/searches/day	30M regular users 5M active auctions/day 22M active items/day 1.8M bids/day 13M queries/searches/day
TPF SCENARIO			
5-Year Cost (\$000)			
Hardware	\$1,213	\$1,041	\$4,860
Maintenance	154	186	870
Software	686	686	6,860
Personnel	1,448	483	3,378
TOTAL	\$3,501	\$2,396	\$15,968
SUN SCENARIO			
5-Year Cost (\$000)			
Hardware	\$1,640	\$1,523	\$6,928
Maintenance	436	405	1,843
Software	39	5	9,716
Personnel	2,290	916	5,493
TOTAL	\$4,405	\$2,849	\$23,980

Source: *Value Proposition for TPF Mail & Web Serving* Management Brief, International Technology Group

New Applications Potential (2)

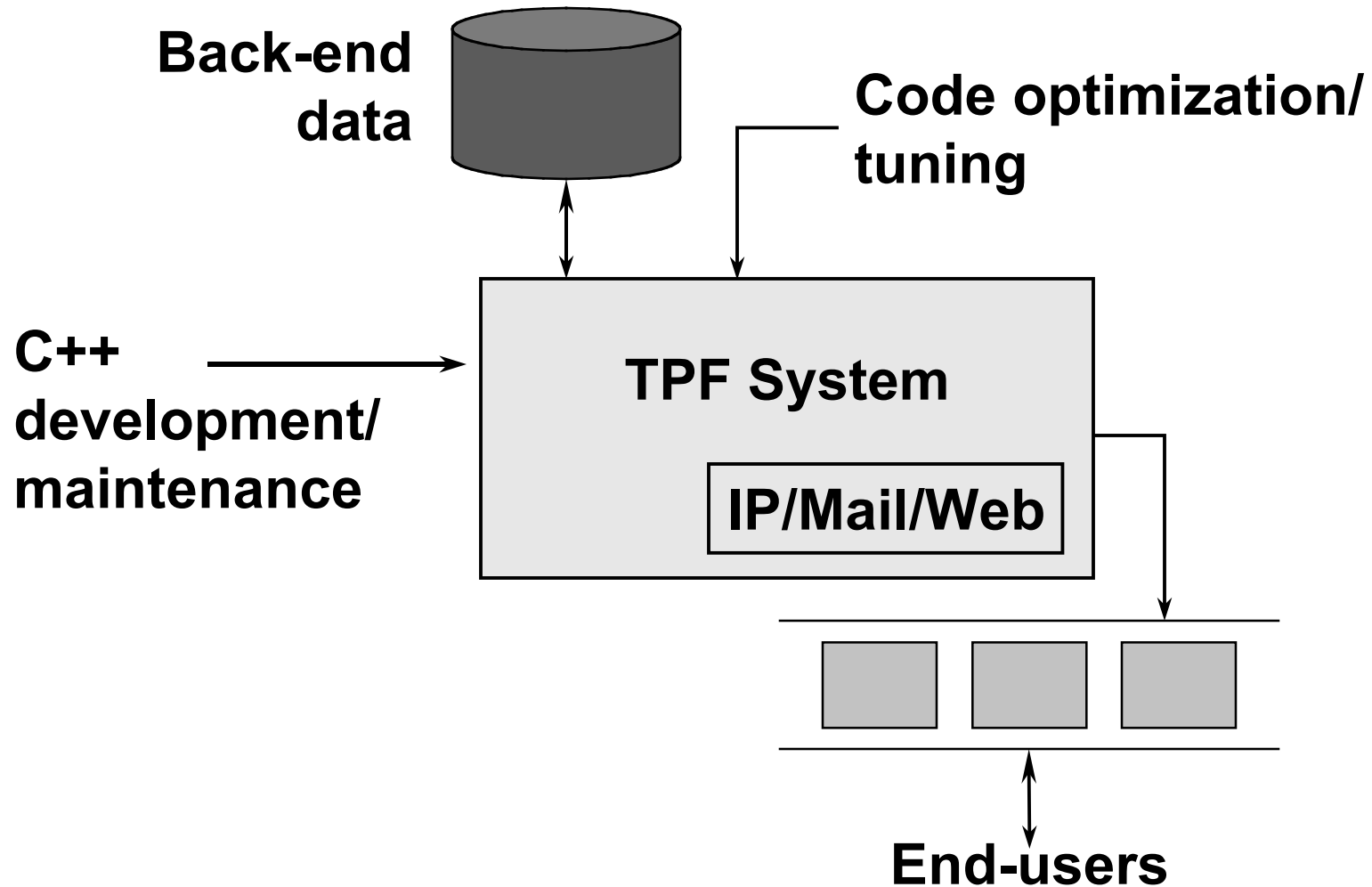
Legacy Extensions

e.g. Dynamic fare pricing
Various

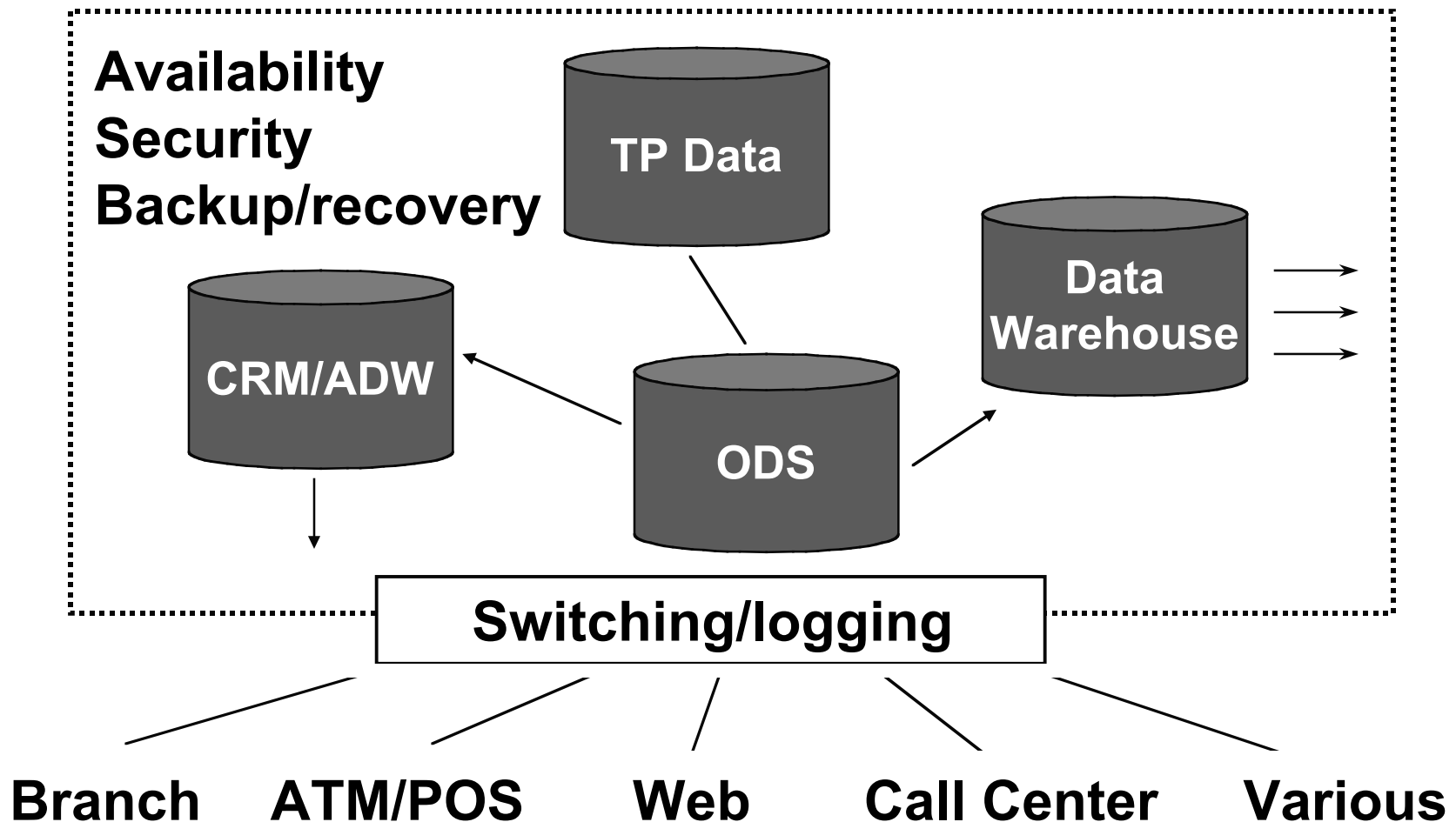
Fault Tolerant

e.g. Stock exchanges
Financial services
Retail/POS
Telecommunications
Various

New Applications Potential (Continued)



New Applications Potential: Financial Services Example

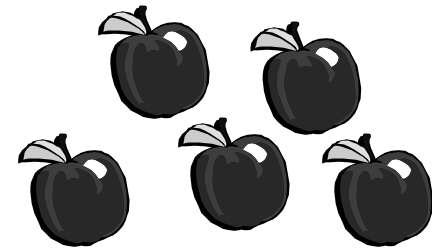


Goodbye TPF?

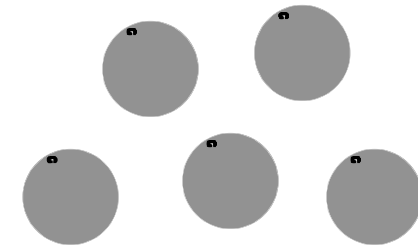
Competitive Claims

- Examples
 - Lower TCO
 - Higher development productivity
 - Better functionality

Apples



Oranges

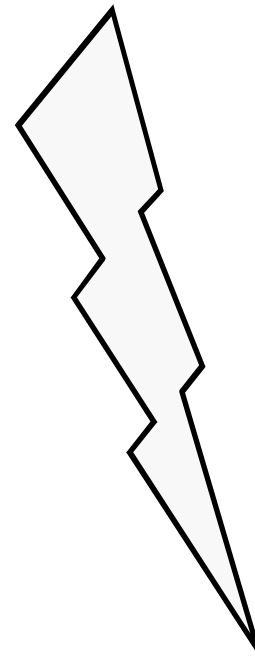


Some Other Issues

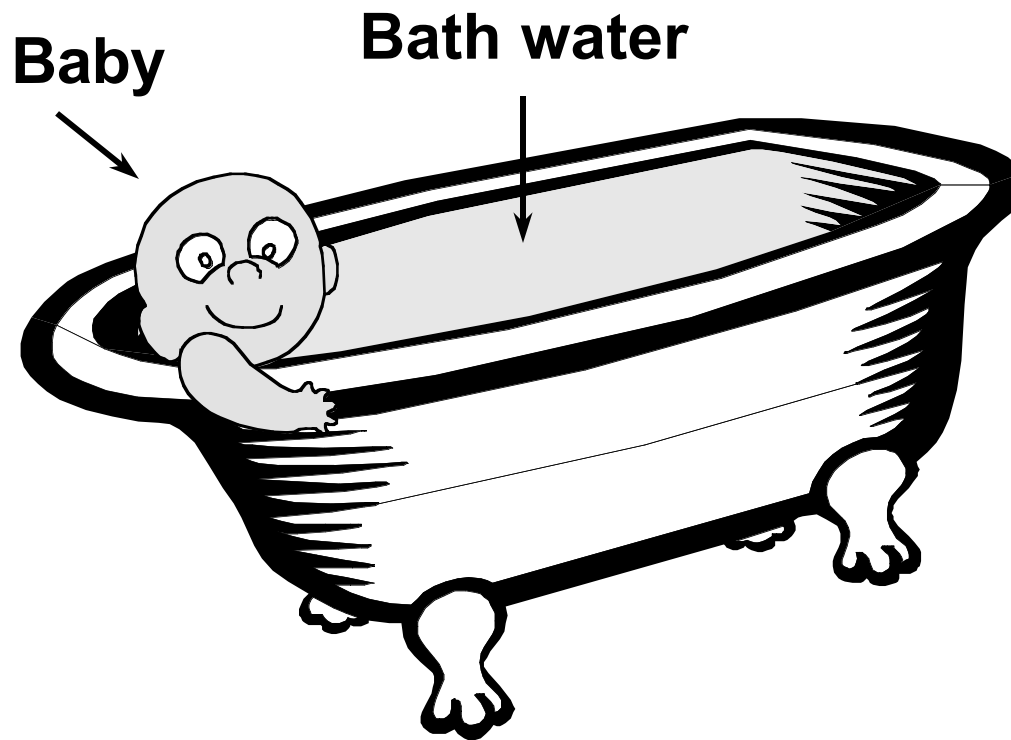
Complexity

Time to market

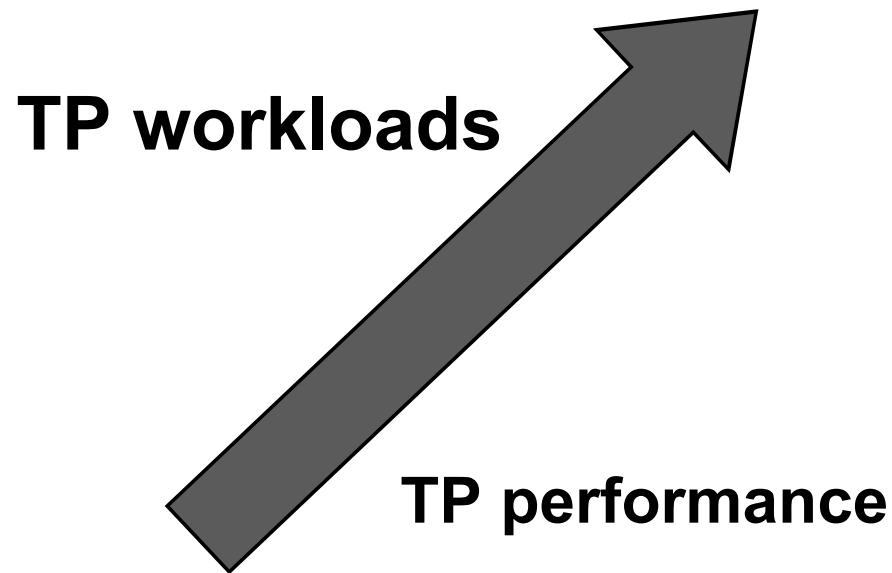
Risk/fallback



Lessons Learned?



Megatrends



Globalization, consolidation, integration

Web growth impact on workload & data volumes

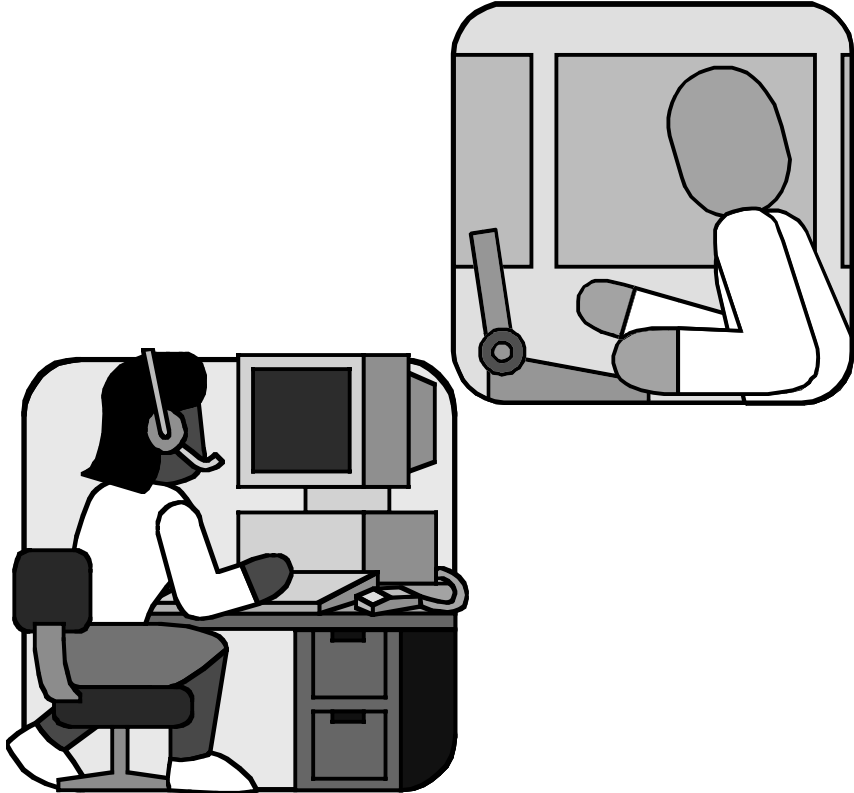
Competitive impact of service quality

Real-time business operations

Cost & efficiency pressures

Megatrends

Web bottom line



- Customers care about quality, convenience, service & cost
- They don't care what technologies you use to deliver them . . .